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ABSTRACT

A study investigated the human and physical resources implications of award restructuring in the textiles and metals industries for the Technical and Further Education (TAFE) system in Australia. (Award restructuring is based on union/employer cooperation in a process of negotiation and compromise between employers committed to increased productivity and efficiency and a work force seeking improved skills, responsibility, and working conditions.) Information was obtained through case studies of the two industries and of several companies in each industry. Qualitative research methods such as site visits, interviews, work observation, and document analysis were used to gather data for the case studies. Some of the key implications that were identified were the following: (1) TAFE colleges need to adapt more quickly and realistically by providing both site-specific and off-the-job training in subject areas identified by companies as being their most pressing needs; (2) TAFE training needs to reflect the impacts of award restructuring upon a company's operating processes; (3) TAFE needs to recognize the internal labor markets being created by award restructuring within companies; (4) greater emphasis needs to be placed on the implications for TAFE of skills, competencies, assessment procedures, and accreditation; (5) TAFE educational institutions should not give priorities to the production of commercially useful knowledge while neglecting the lifelong learning process; and (6) a redirected curriculum focus is needed, integrating vocational education and training systems. (18 references, 16-item annotated bibliography) (KC)

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AWARD RESTRUCTURING AND THE IMPLICATIONS FOR TAFE

With reference to the restructuring being undertaken within the textiles and metals industry

Graham Chataway

Adelaide 1991

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ABOUT THE AUTHOR

Dr Graham Chataway conducts a technology and strategy company operating in Queensland. He has worked extensively in industry, government, and education. Recent consulting briefs have been for the Department of Employment, Education and Training, Canberra; Australian Manufacturing Council, Melbourne; Premiers Department, Queensland; Department of Education, Queensland; and the Bureau of Employment, Vocational Education and Training, Queensland.

EXECUTIVE SUMMARY

This study was commissioned by the TAFE National Centre For Research and Development to be undertaken by the [then] Department of Employment, Vocational Education and Training, Queensland. The Principal Researcher was Dr Graham Chataway, a technology and strategy consultant.

The aim of the study was to investigate, within the textiles and metals industries, the human and physical resource implications for TAFE of award restructuring.

In summary, the following key implications are identified:

(1) TAFE colleges need to adapt more quickly and realistically by providing both site-specific and off-the-job training in subject areas identified by companies as being representative of their most pressing short-term and long-term needs;

(2) TAFE training needs to reflect the impacts of award restructuring upon a company's operating processes. The effect of flatter management structures, new corporate cultures, devolution of management control, and micro-adjustments of manufacturing processes within the firm should all be taken into account;

(3) Award restructuring is creating internal labour markets within firms, and TAFE recognition of the subsequent training opportunities created is warranted;

(4) A flexible and responsive TAFE system that delivers an appropriate package of training is needed by industry; for example, the delivery of modules by TAFE accredited instructors for site-specific skills with successful exiting students being eligible for TAFE accreditation upon completion of generic modules;

(5) Greater emphasis needs to be placed on the implications for TAFE of skills, competencies and assessment procedures, and accreditation that is now explicitly within the scope of the industrial relations system; for example, earnings and industry training for a career are for the first time inextricably linked;

(6) The use of TAFE educational institutions to serve the productive sector by giving priority to the production of commercially useful knowledge while neglecting the life-long learning aspects of TAFE should be avoided;

(7) The emphasis on operational flexibility in manufacturing using Flexible Manufacturing Systems (FMS) is creating a demand for affective skills, such as an ability to think critically and reflexively as well as creatively. Balancing these demands within TAFE is a sensitive resources management and allocation issue;

(8) The operational flexibility of the workplace reveals the need for both technical and a new set of non-technical skills. A redirected curriculum focus is needed, with the curriculum being the mechanism by which all the elements of the vocational education and training system are brought together and integrated;

(9) As industry restructuring within a macro-micro framework exercises greater influence, TAFE systems need to find a balance for allocating resources between supporting the under-skilled to attain a particular level of competence for designated jobs, while ensuring that these scarce resources are not wasted by offering training in excess of labour market and specific job needs;

(10) The emergence of closer relationships between TAFE colleges and their client base of manufacturing companies requires TAFE systems to place greater emphasis upon accommodating delivery unit governance, and encouraging delivery units to develop their product base.

INTRODUCTION

Award restructuring is based on union/employer co-operation in a process of negotiation and compromise between employers committed to increased productivity and efficiency, and a workforce seeking improved skills, responsibility, and working and employment conditions. Many see these aims as being mutually supportive and achievable simultaneously. The rationale underlying these negotiations and outcomes has been legitimised within the forum of the national Industrial Relations Commission.

Competition and change in manufacturing are creating new opportunities. One such opportunity is the improvement of the skills base of manufacturing workers through the educational avenues provided by TAFE. Education and training are vital for the future productivity of the workforce and for our ability to adapt to technological change. But the relationships between education, training and economic performance are complex, and reliance on over-simplistic solutions, or on a mixture of mutually inconsistent policies will not overcome the problems and may make them worse.

Streeck (1989, p.98) emphasises that 'Work skills can be ultimately acquired only at work.' Schuck (1985) and Zuboff (1988) both argue that learning in the informated workplace [where a person accomplishes a task through the medium of the information system rather than through direct physical contact with the object of the task] requires two important conditions to be met - play, and social mediation. As Schuck (1985, p.71) points out, training that is limited to developing task-specific features fails to capture these conditions: 'workers usually learn enough to be able to push buttons, but not enough to be able to push the business.' The discussion by Brown, Collins and Duguid (1989) on situated cognition, culture of learning, and cognitive apprenticeship reinforces the notion that skills development is of little value in industry training if taught in a vacuum. They contend (1989, p.33) that 'People who use tools actively rather than just acquire them, by contrast, build an increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves.' Learning in this way is an important motivator in a changing environment because it is oriented to securing the future, and it provides opportunities for continuous learning. In each of these case studies on the implications for TAFE of award restructuring, the importance that management placed upon on-the-job learning and mastery is emphasised.

The following structure was adopted in order to explore the potential for this relationship between TAFE, award restructuring, and enterprise approaches to training. First some of the economic changes that are causing industries to restructure are addressed. Within that context, the impact of technological change upon manufacturing processes and skilled labour is noted. An assessment is made of TAFE responsibilities within this changing context.

Specific examples of how individual firms in the textiles and metals industry are restructuring and addressing the training issue are provided.

These case studies are an analysis of qualitative change within the system. Each provides evidence that in their forward planning processes, learning and training are anticipated as integral parts of effective industry performance. From this discussion and case studies data, a summary of the implications for the TAFE system is presented.

CHANGES IN MANUFACTURING AND THE TRANSFORMATION OF WORK

Manufacturing industry in Australia is undergoing rapid change. With greater international competitiveness and growing pressure for a more productive, efficient and export-oriented manufacturing sector, shifts in the composition of manufacturing must take place. Australia has to move out of low skill-intensive manufacturing into technologically advanced, skill-intensive industries. The number of low-skilled jobs will decline in the economy as a whole and within the manufacturing sector.

Throughout the world, manufacturing is using new production and managerial techniques, incorporating new technologies into production processes, and value-adding to traditional manufacturing.

The 'ideal' information-intensive productive organisation now increasingly links design, management, production and marketing into one integrated system. In these new manufacturing processes with a reliance on new technologies and computer-mediated work, the skill profile appears to shift from a concentration of middle-range craft and supervisory skills to increasingly high- and low-range qualifications, and from narrow specialisation to broader, multi-purpose skills for information handling.

Important developments in these manufacturing processes include the new production management technologies of automation, Flexible Manufacturing Systems (FMS), Just-in-Time (JIT), and Total Quality Management (TQM). Incorporating these technologies into the flexible work organisation has a profound impact on patterns and levels of skills formation.

Integrated manufacturing requires less direct intervention and a more indirect, supervisory role. (Hayton and Harun 1988) Successful automated production requires maintenance skills able to cope with a substantially increased machine use (continuous operation), as well as monitoring and facility improvement. Specific skills and qualifications for particular equipment have to be upgraded as equipment becomes obsolescent. Operator and management level skills must reflect this flexibility and breadth.

SKILLS AND TRAINING

With the growing decentralisation of organisational structures, a two-way flow of information is set to dominate enterprise operations. This means a move from once typical pyramid shaped organisations to those whose structure reflects a series of open organising processes. This new organisation is often seen by management as a cluster of activity sets and not a rigid structure, and as such it demands a substantial upgrading and broadening of skills.

With the acceleration of change a need arises for new and different skills, and combinations of skills. Traditional skills may be less in demand. These two aspects can be balanced by matching training and retraining outputs to the requirements of changing skill structure and composition demand.

Narrowly defined jobs are being replaced by broader job classifications, resulting in the need for different skill profiles such as multi-skilling, group rather than individual skills, and transferable skills. With new technology and new types of work organisation transforming work tasks and job design, workers must reshape and upgrade their skills continuously if they are to meet their current job requirements.

The transition from 'traditional' work patterns to 'modern' requires a total rethinking of training. Training providers thus have to accommodate the demands placed on them by the trend towards integrated manufacturing. Skill shortages, the cost of 'poaching' quality labour, and high costs of downtime when special equipment is out of production, all suggest the need for factories to 'grow their own' skills.

As the pace of technological change quickens, trainers also need retraining. The notion that training undertaken at the beginning of a person's working life is training for life, is out-of-date. By the 21st century training will clearly be a continuous career process.

These trends have a substantial impact on:

- the development of training programs appropriate to the demands of the new technology; and

- the breadth of vocational training (the greatest benefits are derived from broad knowledge).

The new system eliminates the rigid occupational box system of classifications, and replaces it, by means of broadbanding, with a more flexible, broader-based framework.

Consequently, the following features encapsulate the training system now being developed:

- nationally integrated and accredited - not differing State by State;

- a modular 'building block' approach, where credits build up to give access to higher achievement levels;
- competency-based qualifications, as opposed to time-served;
- vocational training to commence in secondary schools;
- a new approach to apprenticeship and to training for youth;
- the elimination of problems of unequal access; and
- more responsive to changes in technology.

GENERAL ISSUES AFFECTING TAFE

Within this framework a number of issues affecting TAFE are identified. They include:

- awareness of the magnitude and subsequent impact of these changes has not yet entered mainstream educational thinking;
- enterprises are responding, but generally there is limited access to training which in many enterprises is still at the periphery of concern rather than at its business core;
- industry as a knowledge producer is beginning to influence public education;
- application of technology to distance education could make a substantial contribution in terms of equality of access;
- little attention has been devoted to the technology transfer process of adapting educational technology into mainstream education so that it becomes more readily available;
- an ambiguous situation is emerging as a result of the different demands placed upon TAFE by a diversity of interests that require different types of response at different times; e.g. college directors and staff are coping with increased autonomy and the demands of commercial activity within changing markets, while at the same time having to meet stricter operational standards imposed by TAFE authorities;
- technological obsolescence, as well as the under-utilisation of computer technology in delivery systems resulting from the inadequate knowledge base of teachers;
- the problematic nature of the computer-mediated workplace where:

  (i) work organisation and conditions into which the exiting TAFE students enter are reflecting the

dynamics of a computer oriented workplace;

(ii) workers experiencing the need for retraining and new skill formation as a result of the introduction of information technologies into the workplace are increasingly seeking out TAFE as the means through which they can respond to the exigencies of the changing workplace and work organisation.

CASE STUDY RESEARCH METHODS USED

Each case study highlights the choices that management makes in looking for areas where innovations can be encouraged, outdated activities transformed, and new technology introduced. The focal point is the process of change, **how** the different activities considered have emerged and developed, and the implications for training and retraining, particularly for TAFE.

Although beginning from a broadly similar general industry framework, each case study is identified by unique characteristics reflecting both the interests and approach of the different managements, and the contrasting experiences within their industry. While each stands on its own, they form parts of a whole from which general conclusions about training can be drawn across them.

Qualitative research methods such as site visits, interviewing respondents, observation of work, and document analysis were used to gather the data. In some of the case studies follow-up visits were used to clarify areas of uncertainty. Drafts of the case studies were fed back to respondent companies to verify the observations made.

Substantive data from the textiles and metals industries that support the claims made in this paper are presented in the series of case studies. Each provides a separate and unique picture of how award restructuring is aiding the economic system to adapt to new challenges and to assimilate new opportunities.

To illustrate this point, each now treats the market structure as a dynamic rather than a static concept. In addition, the translation of technological change across industry is dependent upon how the enterprises take advantage of the opportunities. Thus the link between changes in technology and changes in industry structure is corporate strategy. Training and retraining in the context of award restructuring are key aspects of the corporate strategy in each of the case studies.

Furthermore, this type of analysis provides additional information on why different firms select different strategies. Understanding the significance of this "endogeneity [internal features] of technological change" (Stoneman 1988, p.193) tells us a great deal about how technological change as an instrument of corporate strategy is determined. More often, the nature of technological advances are highlighted rather than the value of

their implementation upon the internal organization of the enterprise.

CASE STUDIES IN THE TEXTILES INDUSTRY

Clothing manufacture is considered a 'sunset' industry by those who are unaware of the restructuring that is occurring across the industry and within many enterprises. Industry commentators have underestimated the significance of **market changes** such as:

- retail distribution and industrial structure;
- the fragmentation of the mass market;
- new retail competition;
- design as a two-way process;
- tailoring supply to demand;

or **technology** such as:

- computer-aided design;
- computer numerically controlled cutting;
- management information and production control;
- the sewing machine and the micro-chip;
- multi-skilling and productive flexibility.

The international leaders in integrated manufacturing in textiles, Kurt Salmon Associates (1988), contend that Quick Response Implementation is altering industry thinking. Quick Response, or 'quick change' as it is sometimes known, is a partnership strategy for retailers, manufacturers, and mills designed to achieve improvement in, and faster tracking of the right information and products through integrated merchandising and production pipelines, faster lead times and new product development.

In Australia the Textile Clothing and Footwear Development Authority has been established to oversee the Government's plan to revitalise the TCF industries. The 1986-87 Annual Report of The Industries Assistance Commission (Industries Assistance Commission 1988, p.113-121) contends that the anticipated program of reform has the potential to increase industry efficiency and reduce the sector's reliance on community support. The TCF Council and the TCF Industry Training Council have made complex statements about the role of strategic planning and the benefits of investing in long-term systematic training. The latter has commissioned research into a promotional strategy for training in the TCF.

The TCF industries provide clear examples of some of the difficulties of restructuring in industries which have been less clearly industrially defined than others, for example, the pace-setting metals. Aspects of restructuring in this industry which still need to be addressed include the following:

- Machinists' jobs in TCF already are broadbanded. The task remains to 'unpack' specific skills and tasks from those

broad classifications, so that experience and training requirements are recognised.

- A key issue in this industry is improving quality and developing products and markets in the high value-added end of the industry.

- The adoption of an industry, rather than an occupation-based approach, is needed to provide mobility and to develop cost-effective training arrangements.

It is against these wider industry changes that the case studies are assessed.

SUMMARY OF CASE STUDIES: TEXTILES

Some consistent themes (production, people, management, and training) emerge and provide an insight into implications for TAFE:

(1) Production

The textiles companies surveyed focussed upon the production and marketing of a differentiated product range targeted at specific retail market niches. All had developed over a period of years a single quality product for a niche market. They strictly adhered to predetermined quality control levels. Safety and 'good housekeeping' training were paramount. They incorporated flexible production processes for individual product lines. Quick Response techniques (dramatically reducing the time from garment design to delivery) were used. While the U-flow cell with machinists standing and operating a number of machines provided the optimum conditions for both employee involvement and productivity, many versions of the modular manufacturing unit were displayed in this survey.

There were varying degrees of adoption of technology in production. One company used modern, but not the latest sewing machines. This company relied on a level of technology appropriate to the emphasis placed on people processes within production cells. Another concentrated on using CAD for garment patterning and new design, and stressed time management and methods engineering with traditional 'passing bundles' technology. This resulted in tightly managed production units in a physically separated production layout. The third placed great stress on new technology, employing the latest industrial sewing machines with attachments, and used by employees at individually engineered work stations.

(2) People

With 'passing bundles' production, there is considerable piece-work. Incentive schemes operate for all, as well as a group bonus as groups achieve overall objectives of productivity and quality. This produces a sense of worker involvement. All

companies have a nucleus of long-serving skilled staff in each production area. Production processes are arranged so that opportunities exist for job rotation. In addition there are opportunities to progress in-house, especially as a cell member or team leader, i.e. a career path through an internal labour market. With Quick Response, cells and the various production techniques employed, groups and teams were developed. This flexible production also requires flexible skills.

The basic skill level of the machinist operating in the modular unit is considerably higher than the machinist in the bundle system. In the former, each machinist must be capable of operating three or more machines, understand the principle of line balancing, and be able to work and participate as a member of the team. In the ideal situation the team is self-managing, monitoring their own productivity and quality. This requires the development of conceptual skills in the workplace which in some companies will dominate over the declining traditional manual skills.

(3) Management

All companies display a close management and employee involvement that leads to tight control over production. There exists a co-operative working approach towards mutual goals that is arrived at through dialogue between management and the factory floor. Moreover, a consultative approach is taken to identifying issues. This two-way communication and openness among workers is a strong feature of each company's 'culture'.

These open communication channels between management, supervisory levels and line production create collaborative and flexible work environments. This flexibility is more a function of the organising processes created, rather than it being determined by the technical features of production.

(4) Training

While management sees a role for TAFE in developing basic machinist skills, in-house training is favoured for their factory-specific skills. They recognise the need for broad initial training and continuous retraining. This is particularly important for supervisory and middle-management.

Retraining is particularly important where there is a high labour turnover and incidence of women re-entering the workforce. The retention of a small group of specialist and long-serving staff provides opportunities for role modelling and peer training. The consultative process undertaken within team meetings encourages critical thinking and use of the workplace as a resource and place for learning. One TAFE college is making concerted efforts to prepare modules consistent with industry job classifications, and delivering them to one of these companies in-house.

IMPLICATIONS FOR TAFE: TEXTILES

The educational needs are strikingly obvious. TAFE plays very little part in satisfying the basic training requirements of these clothing companies. There seems to be a gap between the firm's requirements and the type of product TAFE is delivering. Within the clothing companies studied, the emphasis is on micro-adjustments within the firm: most changes can be accommodated by in-house training, with career-path opportunities available through internal labour markets within individual companies.

Private providers appear to have gained a market edge matching each firm's needs. The following is an example of a course structure on **SUPERVISOR DEVELOPMENT** offered by the Australian Institute of Management and containing the following modules:

Industry and Award Restructuring
Role of Supervisor
Communication
Working in Teams
Leadership
Problem-solving/Decision-making
Conflict Resolution
Safety

This was viewed as meeting the needs of one of the companies, and courses in this area offered by TAFE were not seen as suitable.

The impact of flatter management structures, and new corporate cultures, are creating fundamental changes in the management of organizations.

Consequently, TAFE needs to:

(i) prepare more appropriate modules, reshaping its products to match industry needs, especially as award restructuring implications become more pressing at the firm level, and market them more effectively;

(ii) ensure that management modules are relevant, up-to-date, and can be delivered in-house; and

(iii) flexibly address change.

TAFE needs to be flexible, providing modules in-house by TAFE accredited instructors, with successful exiting students being eligible for TAFE accreditation. While private providers are being used by each of the companies for middle management courses and re-training, TAFE is losing out. At present TAFE colleges do not appear to have the right product mix to deliver. They need to develop new modules, and present them with different delivery systems.

THE STUBBIES CLOTHING COMPANY LIMITED

The history of the Stubbies Clothing Co. commenced with the original company founded by Edward Fletcher in 1938. The company gained prominence during the war by manufacturing army uniforms. Then they employed a staff of sixteen.

Stubbies shorts were developed in 1972 and immediate consumer demand launched Stubbies as a major menswear manufacturer. Today Stubbies employs 700 staff, and is Queensland's largest manufacturer of men's and women's clothing. Products targeted at specific groups of consumers include Stubbies, Ruggers, Tabs, Street One, boardshorts, racers, fashion shorts and pants, T-shirts and ladies wear. This differentiated product range is produced by the use of computer-based technologies, new management technologies, enlightened human resources management, and revised methods of manufacture. This product range is sold on the domestic market, and overseas in the USA, Japan, and in other countries.

Stubbies is geared to respond rapidly to short-term trends in the sales of individual product lines. Rather than turning out long runs of individual garments at the lowest possible unit cost, they are designing and manufacturing a wide range of styles at the lowest cumulative cost. To do this, they use CAD for the pre-assembly stages of pattern development, as well as for grading and lay planning. One of the latest Gerber cutters provides substantial gains in the speed and accuracy of the cutting process, resulting in improved fabric utilisation and fewer defective parts in the assembly process. The range of fabrics and their different cutting characteristics led to the retraining of existing skilled staff on the new equipment.

A flexible manufacturing Just-In-Time (JIT) production line taking the place of conventional bundle operation is used. 'Quick Response through Flexible Manufacturing' is the key concept underlying its operations. For instance, managements are conscious that the unstable properties of limp fabric necessitates extensive manual positioning by the sewing machine operator, a problem which is partly overcome by the use of ergonomically designed table and bench layouts.

Improvements in production result from the use of the most modern industrial sewers for pockets, elastic waists, zippers and so on. Dedicated micro-processors and numerical control units are used for beltloop attachment and collar stitching, and pre-programmed convertible units for more variable tasks such as contour seaming, pocket setting and decorative stitching.

Individually engineered work stations have substantially improved production flows. Improved management information and production control enhance the total operations. Thus Stubbies has focussed on the combination of group working practices, manual skills, electronic sewing machines, and careful line planning to maximize productivity. In this company, there is the recognition that increased flexibility of production lies not only in new

technology but in the skills and training of the workers themselves. No matter how good the technology is, manual intervention in guiding the material remains crucial for the effective use of the equipment.

Given the necessity for maintaining manual methods in garment assembly, a major source of scale economies on longer production runs has been the increased productivity of machinists as they progress up the learning curve for each style. Flexibility is inbuilt to encourage machinists to become proficient at a range of sewing operations thus avoiding costly bottlenecks and line imbalances. This leads to a need for broader initial training and continuous retraining. Strict quality control and audit measures are in place throughout the manufacturing processes.

Most machinists are trained or retrained in-house. A comment was made that if they are TAFE college-trained, they do not match Stubbies requirements, and have to be retrained for the company's specific purposes. It was suggested that it would be mutually beneficial if one of the TAFE instructors worked at Stubbies for a period. They would receive industry-specific experience and a renewed approach to teaching machinist skills, especially using newer technologies which emphasize the increased productivity of machinists.

With the current emphasis on management information systems (MIS) and production control, the company has commissioned the Australian Institute of Management (AIM) to develop a supervisory development programme, whose objective is to provide supervisors with the knowledge, skills and attitudes to enable them to be more effective in the conduct of their jobs and in implementing change in the company's operational structure and style. As shown previously, modules cover the following areas:

Industry and Award Restructuring
Role of Supervisor
Communication
Working in Teams
Leadership
Problem Solving/Decision Making
Conflict Resolution
Safety

As a result of award restructuring changes, a consultative committee has been established within Stubbies to develop a joint approach to problem-solving and decision-making. This company is a pilot company for testing the new wage and classification structure within the textile, clothing and footwear industry.

PALILA CLOTHING CO.

Palila was established in 1949 as a partnership between Parton, Lieberman and Lander, with the first two letters of these surnames being used to form the name Palila. Now it is one of the largest employers in Toowoomba and manufacturers garments for

companies such as King Gee, Cant Tear'em, Stubbies and Yakka. Palila concentrates on the Australian market, but through other companies some of its products are exported to the United States and Japan.

The current output utilizes two types of production lines: piece work with sit-down sequential line production, and stand-up Just-In-Time (JIT) Unit Production Cells which emphasises Quick Response manufacture, and the use of group skills and multi-skilling. Shortly, the complete production process will make use of JIT units. Quality control is a high priority. The use of these production processes on the specific product range, together with strong relationships with suppliers and retailers and a stronger timing coordination between orders and sales, gives Palila a competitive advantage over similar companies.

An incentive scheme allows for either finishing early for the day and going home, or building up credits when the required number of items per day are completed. Staff amenities include a house for withdrawal periods, and a grassed area with tables and chairs as a relaxation area. Safety guidelines are closely monitored. Good housekeeping practices are maintained, and are regarded as a maxim: all work areas are kept clean, and the aisles clear. Only properly trained staff are permitted to operate machines or equipment. Two qualified electrical tradespersons are always on hand to make adjustments or repair the industrial sewing machines.

A consultative committee consisting of union representatives, and elected workers meet regularly with management to discuss any issues of concern or offer suggestions for improvement. The most notable feature of the factory is the high level of communication that prevails among all management, supervisors and shop floor staff. Many employees are of long-standing, and have returned after child-rearing years.

Most training is done in-house with peer training, and co-operative learning by means of achieving production quotas in time and at appropriate quality levels. Palila is currently negotiating with the local TAFE college to jointly develop a machinist training course, with a view to Palila becoming a private provider. These courses are intended to focus on basic machining skills required to operate the plain sewing and the overlocker.

Contents include:

- manipulative exercises for eye/hand coordination;
- knowledge of fabrics and suitable thread;
- the specific operations including preparation of: pockets, collars, zippers, hems as a timed exercise;
- sample construction;
- specific finishing: buttoning, buttonholes, elasticised waists.

There are plans to follow this basic course with a more advanced

course in clothing machinery, industrial cutting (clothing), skills update (industrial clothing machinist), introduction to garment construction, and sewing machine and overlocker technology.

FREEDMAN

This family-owned clothing, suit and trousers, and specialist designer-wear manufacturer in the Valley, Brisbane started as a cut-make-and-trim garment producer in 1913. The founders in the early years travelled with their product range throughout northern NSW and southern Queensland marketing their quality garments. Given these traditions, it is not surprising that the Freedman of today is characterised by the production of a limited range of quality products in a family-oriented and informed management climate. The company management is committed to a hands-on approach in management as well as being closely involved in all details of the manufacturing processes thereby producing a tightly-coupled production process. Such involvement leads to the retention of long-serving and key staff with obvious pride in their completed product. There is minimum employee-turnover. About 250 people are employed. A management philosophy of expressing faith in the economic future provides the staff with work goals.

Time management and costs per minute are critical factors in determining the production processes. Significant re-engineering of jobs has led to time-efficient production, and arrangement of work-flow processes throughout the factory. Machinist and machining skills training is conducted in-house. Overall there is a small element of passive resistance to multi-skilling, and management believes that exceptions need to be accommodated.

A Gerber AM5 CAD system is used for design of garment patterns. Here some initial de-skilling has led to re-skilling of cutting staff for other cutting room operations. The cutting room is stand-up with serried rows of work benches. Workers are skilled measure and stock cutters. Their job satisfaction comes from knowing they have 'to keep the factory fed'. The trouser plant operates using piece-work processes, and the process line functions making use of the physical 'passing bundles' technique.

The coat plant uses specific skilled labour such as sleeve head operators, job finishers, and tailors. Body lining, pocket installation and checking the shape of lapels are indicative of the skilled jobs. The work motto here is 'Two things make a coat - the collar, and sleeve pitch'. In this coat plant there is a degree of job rotation, especially in the finishing areas with some employees moving among four to five finishing jobs. Another section of the factory houses the Kerry Craig specialist designer wear. Under licence they manufacture and distribute the Jack Nicklaus garment range.

From this type of factory organization where open management-employee communication, quality control, and time-conscious

production are the order of the day, a key feature is that the intermingling of these management and production techniques is producing a conscious, integrated approach by the shopfloor workers towards the final product. It is as if the employee sees the partly-completed product as the finished garment on the consumer. This holistic approach to the manufacturing process appears to be a dominant characteristic of the Freedman productive culture.

During the past decade particular attention has been given to the following key factors of production:

(a) time and methods engineering and Quick Response production that lowers the minute value of production;
(b) quality control;
(c) developing and maintaining relationships with specific market outlets for the Freedman label;
(d) management which is involved, pays attention to detail and exerts pressure; and
(e) collaborative work environments.

Combined, they have created principles for consensus within the factory.

METALS

The metals and engineering industry is at the frontier of industry restructuring. It has embarked on award restructuring as a major priority. Previously, awards in metals and engineering were archaic, designed to create divisions and demarcations. The new system does away with the rigid occupational box system of classifications and, by means of broadbanding, replaces it with a more flexible, broader-based framework. How metals companies are approaching these issues is highlighted in the case studies.

SUMMARY OF METALS CASE STUDIES

There are some consistent themes that emerge from these case studies and which provide an insight into implications for TAFE. They emerge under the production, people, management, and training headings:

(1) Production

New production technologies have been adopted. Each company has invested in suitable new technologies and computer-integrated manufacturing. Jobs were redesigned, and new layouts were implemented, removing all non-value adding steps. This task required critical assessment of jobs in the context of their function in the workplace, i.e. the sort of critical thinking skill which is now pivotal in the industry restructuring process. Factory sections were responsible for the various departmental layouts, which developed a management/shop-floor co-ownership. Process routing was substantially improved. Attention was

directed to housekeeping through the provision of wastage bins, uncluttered floors and aisles. The need for new skills was experienced when untried equipment was installed, and debugging processes undertaken. Attention to flexible production, agility, and quality became paramount.

A whole systems view of production was encouraged. To create this single system view, parochial boundaries were removed, and inter-relationships between functions were emphasised. Higher degrees of organisational integration, especially between production, sales, and administrative services occurred.

(2) People

Multi-skilled task forces were created to make the internal adjustment necessary for better production. Peer pressure was exerted to produce greater co-operation among the management to shopfloor spectrum. Democratic processes emerged as a result of team groups and team linkages. Seeking out and developing alternative approaches characterised the new work organization. Examples of these are problem-solving techniques, and improved two-way communication through the tracking of information flows. There were considerable changes on the shopfloor in the pattern of work organisation and job designs and new opportunities for career paths emerged. These changes were accelerated by the impact of autonomous work groups and consultative committees. Consequently, changing organisational cultures that were characterised by more openness, a culture of co-operation, and mutual awareness emerged.

(3) Management

There is evidence of internal restructuring within the enterprise prior to, and in anticipation of award restructuring. These strategies underlying the rationale to restructure were based on approaches to the market and operating conditions. Quality audits were undertaken. These identified a need for new management technologies (JIT, QC). Information technology linkages between marketing, distribution and production using Flexible Manufacturing Systems (FMS) led to functional integration, and a single system view of the process. The 'no islands here' approach is important. It led to management change, better integration, improved productivity, quality improvement, cost containment, and efficient manufacturing. Evidence indicates a greater spread of management responsibilities, with a deal of shopfloor self-management.

These management changes reveal the importance of two-way dialogue, collective will-formation, communication at meetings, and a dedication to common goals essential to bring about restructuring. An outcome is the more conscious development of 'top-down/bottom-up' information feedback loops characteristic of flatter management structures.

(4) Training

There is some emphasis on in-house training, and a preparedness to link with TAFE to provide this training in-house using company equipment. Management recognises the importance of portability of qualifications, and gaining TAFE accreditation.

Competency-based training, individualised and self-paced through computer-aided and computer-managed instruction is used in most company training programmes. Critical thinking techniques are context-embedded by being developed at the workplace. The shopfloor management of layout is a good example of this. In addition to core skills, opportunities to use other skills emerge. These include analytical skills (such as with hydraulics and pneumatics), conceptual and critical thinking, problem-solving, team participation and negotiation skills. In addition an overview of the continuing impact of award restructuring initiatives at enterprise level is developed. The evidence suggests three distinct needs emerging from award restructuring: emphasis on core competencies, the development of firm-specific skills, and generic competencies, such as knowledge of manufacturing processes in order to understand the role of new technology.

IMPLICATIONS FOR TAFE: METALS

- training modules are needed for the generic areas identified, such as TQM, VAM, JIT, problem-solving, conducting meetings, communication, team working, critical thinking and so on;
- TAFE is undertaking skills audits to identify appropriate skills required for industry, but given the speed of change identified within these companies, the time is rapidly approaching where TAFE will be behind in standards setting unless it reacts more rapidly;
- flexible response to site-specific training needs;
- developing programs for mature age apprentices;
- TAFE responses to accommodating portability, competency-based training, national curriculum, national accreditation, and standards under the award are currently being developed. The process needs speeding up so that TAFE leads rather than follows;
- there is a need for TAFE to update courses, providing subjects for which a need is generated within companies; these include technical/practical upgrading, with add-ons such as overview subjects: Restructuring, ProblemSolving, Committee Procedures, Career Path Management, Leadership;
- more resources developed for open learning/self-education opportunities in the areas identified above;

- in the light of previous experience with TAFE these companies believe that TAFE colleges need to adapt to change more quickly and be more market oriented.

TYREE WESTINGHOUSE

Tyree Westinghouse at Darra, Queensland, manufactures specialty and dry type transformers for electricity supply authorities and private industry around Australia. It is currently participating in piloting and testing procedures for the Metal Industry Award for a new wage and classification structure.

In a number of ways the Company anticipated award restructuring and its implications. Internal and external quality audits in 1986 revealed that a number of production and management changes were needed if greater quality, productivity and profitability were to be achieved. In particular, the failure of Quality Circles to produce greater involvement of all employees meant that a different focus for employee participation needed to be developed.

Value Adding Management (VAM) techniques were introduced to a pilot group in early 1987. This was a cross-sectional group covering management, manufacturing and engineering staff, as well as the factory floor. The aim was to improve processes and procedures which would lead to reduced cycle time, reduced work-in-progress, reduced rework, and increased productivity.

The resultant dramatic improvement in productivity led to the introduction of VAM throughout the Company during 1987. The following major developments took place:

(1) A task force steering committee of top management was established with some eighteen task forces reporting to it. These task forces were multi-disciplinary teams, whose objectives were to reduce both direct and indirect costs, improve quality, reduce cycle time, and rationalise the process - from orders entered to dispatch. The process of rationalising and standardising the numbers of materials used, design configurations, manufacturing processes or streamlining production and information flow was also a major focus for these task forces. Reduction in inventory was a logical by-product of this focus.

(2) All factory sections worked on improving the layout of their own departments with a view to a completely reorganised factory layout at the end of 1987. The emphasis was on reducing space required so that a new product line could be incorporated within the existing factory, without increasing total floor space.

These departments incorporated their ideas and actions into an overall plan. The whole factory production line and layout was renovated during December 1987 to February 1988, and the new layout incorporated the plans described above.

It resulted in a sustained reduction in manufacturing cycle time of around 45%.

(3) An employee consultative committee involving senior management and all departments was established, and meets bi-monthly. It acts as a forum to consider ways of further improving productivity and quality. Some previously unresolved issues have been cooperatively settled by this committee.

(4) Greater numbers of factory employees were trained in JIT/VAM principles, and they contribute to quality, cycle time and productivity improvements. A JIT/VAM steering committee has been set up, with a structured agenda that focuses on four measurements that highlight the integrated nature of production. Graphs and trend reports are used to display, discuss, and resolve current problems. As a result of their meetings, peer pressure between departments led to increased activity and improvements in all areas. Leading Hands have taken over a leadership role in these negotiations.

(5) The co-involvement of 'top-down management' and 'bottom-up activity' has led to the implementation of JIT/VAM techniques into management information, production control, and service functions.

Inherent in the above changes has been the management's explicit commitment to long-term strategies that encompass JIT/VAM principles and techniques. Training in this area has focussed on improving functional skills for employees in the metals industry, and an orientation to Total Quality goals. Within this, a culture that accepts change more readily is emerging.

CONTAINERS PACKAGING (ROCKLEA)

Containers Packaging (Rocklea) produces two-piece and three-piece seamless cans. It has a sophisticated six-colour decorating plant, and an end-making division for a range of cans used by other manufacturers for their products, such as open tops for vegetables, and a large number of general lines. It is a high speed manufacturing environment that employs the latest vacuum technology.

There are about 380 employees at Rocklea. During the past decade production has shifted from suburban Salisbury in Brisbane to Rocklea. Originally a 3-piece steelmaking welded can and decorator plant employing about 180 people, it produced 800 cans per minute and 165 million each year. Substantial capital investment of $10m in new technology such as the 3-piece NORMA aluminium canmaking, upgraded production, first to 3-piece and then to 2-piece aluminium cans. This investment was undertaken in three incremental phases during the past decade. The plant now produces an annual volume of 560 million cans. Four rotating shifts are a feature of this intensive production.

Ownership changes as well as counterproductive management prior to 1978 resulted in the appointment of new plant management to conduct an internal restructuring program. Its focus was to improve relations among factory floor workers so that productivity and efficient manufacturing were increased. Anomalies were addressed, communication improved, and tracking of information flows from the production line improved. The aim was to build a coherent total picture of production and overall factory operations, make it 'hang together', and subsequently to develop a strategy to build on the revitalized structure.

There were four key points to this agenda:

(1) the process was a deliberate business strategy that encouraged consultation, especially among the existing range of shop stewards;

(2) the need for this process was a matter of necessity, even though some stakeholders were not confident about the outcomes;

(3) the atmosphere, given the personalities, union profile, and quality of supervisory levels, was conducive to such a policy strategy;

(4) growth prospects for market domination along the eastern seaboard provided a real incentive.

A number of aspects of this internal enterprise-based restructuring at Containers anticipated the political moves during the late 1980s for industry restructuring, and across-the-board moves towards award restructuring.

As part of this internal restructuring, site management has conducted an organisational audit, implemented wage structure bands, and provided in-house supervisor and middle-management training.

While the restructuring process addressed anomalies and revitalized organizational structures, it nevertheless intimidated and alienated the employees. However, with the development of new production lines with technology enhancements, the use of multiple feed flow processes, new shift arrangements, and on-the-job training of jobbing operators into more skilled workers, factory-floor morale and commitment to cohesive production began to dominate. 'The whole experience was like pulling teeth' remarked the plant manager.

For the improved production flows, a new grade of production fitter and turner who has analytical understanding of hydraulics and pneumatics was required. For maintainer non-trades, there is a need for a type of 'troubleshooter' on the job, who can strip a piece of equipment down ready for the fitter.

Provision needs to be made for on-the-job assessment of competency-based performance, and accreditation from some

external source. Initial discussions with a TAFE college, whereby Containers Packaging enter into a lump-sum contract for the development and in-house delivery of a program were abandoned because the commercial aspects proved unacceptable to a TAFE culture unaccustomed to commercial activity.

Currently arrangements are well advanced with another TAFE college for the development of such a program, and will include TAFE staff teaching tailored modules in-house on Containers Packaging equipment.

The plant management during 1990 conducted management briefing sessions on award restructuring for all employees. The sessions were of three-hours duration in company time, and conducted in-house in Containers Packaging training rooms. Presenters were the Plant Manager, and a Training Officer from the Trade Union Training Authority (TUTA).

Of interest is the content of overheads used by the Plant Manager which are reproduced here without alteration to provide the reader with the specific detail that is being used by one company to inform the shop-floor about award restructuring:

(1) INTRODUCTION

- Why are we here and what is the purpose of these sessions? **SURVIVAL!**

- A changing, more hostile world has demanded that we rethink the way we operate - interest rates, deregulated financial sector, etc.

- The Industrial Award System and the culture or way of conducting Industrial Relations in Australia is no longer appropriate for the 1990s and beyond.

- The magnitude of the problems facing Australian industry are so large that it is only as a united and cohesive force that we can secure any sort of future other than being a farm or a quarry for the world - hence these joint sessions with the A.M.W.U.

- Award restructuring will only succeed if all participants want it to, and they will only want it to if there are benefits for all coming out of it.

(2) ROCKLEA PERSPECTIVE - WHY WE SUPPORT AWARD RESTRUCTURING

- Rocklea has been the most successful site in Containers because of the way we have worked together and the absence here of the barriers to efficiency that exist elsewhere

- This success has always allowed Rocklea management to secure investment funds for expansion and modernisation in preference to other operations

- We started to move towards our own version of restructuring eighteen months to two years ago because we recognised the following points:-

  (a) The site was now very large and complex and therefore we wanted to avoid all the pitfalls of large operations.

  (b) The market was getting tougher with selling prices falling and costs increasing (glass, imports of open top cans, another 2 piece can manufacturer)

  (c) The plant was aging and the opportunities for significant engineering improvements, especially 2 piece, less available

  (d) Long term view that our competitive advantage must come from the skills and energy of our employees - higher skilled, more flexible, more stable workforce will lead to higher productivity therefore lower costs

  (e) We believe that we have a social responsibility for our employees. We would like to make manufacturing an attractive career for our younger employees and we would like our older employees to feel secure and needed in an ever-changing world.

(3) WHAT MUST HAPPEN IF WE ARE TO MAKE ROCKLEA AS SUCCESSFUL IN THE 1990S AS IT WAS IN THE 1980S

(a) Continue with the best of the features that made Rocklea a success in the 1980s; i.e. enthusiasm, innovation, flexibility, and open atmosphere.

(b) Encourage people to view the success or failure of the business as of direct consequence to them.

Success = overtime, employment, promotion, share dividends, etc.

Failure = loss of business to other forms of packaging and the shrinking of our business.

(c) Encourage supervisors and managers to listen to people, harness ideas, tap into the potential of our workforce.

(d) Provide relevant training, which will be of value to the business, to as many employees who genuinely want to improve their situation.

(e) Provide career paths to allow people to use their skills and be paid for using them.

(f) Introduce a culture which requires all of us to produce quality products as a matter of course (i.e. TQM, TQC etc.). This is essential if we are to consider export opportunities.

(g) Become the least cost producer and guarantee our security because of our market position. (That is the only long term security!).

(h) Value each others' contribution and enjoy what we are doing (life is too short!).

(4) SUMMARY

- We are entering unchartered waters where the comfortable practices (both labour and management) of the last few decades will not be suitable for the future.

- It is for long term survival: "You would have to be mad to try it, but even madder not to." [Bill Kelty]

- This can only be achieved by co-operation and consultation. If any group tries to use this process to achieve only their own agenda, it will fail.

- It must evolve to suit the particular set of conditions in a particular business. Any monolithic approach will not be sensitive enough to the needs of the parties.

- It must provide benefits to both parties; i.e. security and opportunity for advancement for employees and productivity increases and hence lower costs for the business. If that balance of benefits is lopsided, it will fail.

- People are fearful of change, however both management and labour must change and this is going to require maturity, patience and cool heads.

GEORGE INDUSTRIES

This private company was formed 35 years ago by two brothers to conduct a signwriting business. Now this company's product range is centred on traffic control products, manufacture of motor vehicle number plates, light metal manufactured components, and a plastics division, manufacturing traffic cones under licence from a US company. It now employs 135 personnel, has an annual turnover of $10m, and is one of the largest road sign manufacturers in Australia.

During the early years the company developed a traditional manufacturing plant, characterised by centralised equipment layouts and poor housekeeping, poor employee-relations, late

deliveries, low quality, and high turnover of factory workers.

In 1988 new management took over. In order to present a single strong corporate image to customers and suppliers, the company changed its name. Furthermore a restructuring program was instituted. George Industries is participating in the pilot testing procedure instituted by parties to the Metal Industry Award for a new wage and classification structure.

The factory layout was based on the principle of similar equipment being located together. All the presses and guillotines were clustered, with no obvious workflow or product process direction. Workers were isolated from the next process, and piles of work were built up round these equipment clusters. It was difficult to trace orders and their respective status, and anticipated delivery dates were never achieved. It was normal to have an orders backlog of 4 months, and dozens of pallets of unidentifiable work in progress.

There was little awareness of work process flows, and quality objectives were unheard of. The Sales Department handled more complaints than new orders, and worker frustration resulted in low morale and a high turnover of staff.

Housekeeping practices were poor, products were continually damaged when being moved within the factory, and the final product often had a high return rate from the customer.

The new management encouraged greater communication about work problems among employees, and began to break down management-shopfloor barriers. The company management participated in the Technology Transfer Council's Value Adding Management (VAM) course early in 1989 and decided to commence a pilot program within the Sign Division as it represented almost 60% of the business.

The first group of voluntary employees undertaking the VAM training course included key supervisors, a union representative, and general employees. This group had the challenge of implementing and conveying the need to change work methods to fellow workers.

A main objective was to institute a program of improved housekeeping practices. This certainly was back to basics, but fundamental to the restructuring process. Special rubbish bins were designed to aid emptying. Storage racks for tools close to the equipment were provided.

The crucial next step was to change the location of most of the equipment. This is fundamental to the VAM initiative, and removes all non-value adding steps. After collecting data on the volume of products handled and their respective routings, an initial layout was determined. Equipment was relocated based on process routing relationships not commonality. This change made a huge visual impact. The real process routing could be seen by all workers, and the flow problems became more visible.

During the first three months selected employees collected data on errors identified. They were encouraged by a 'No Blame' approach to address the real issues - 90% of detected problems were process or system errors. Employees were given the opportunity to learn of the problems and contribute to their resolution. 'Quality Is At The Source' was internalised as a work ethic by factory workers.

Small groups were established. They now meet weekly to discuss their problems, seek information on the process errors, and present the findings for the group to implement the decisions. Management guided the groups to ensure the company objectives were being achieved, and supported members in this learning process.

As part of the change process, team members were encouraged to share their concerns to their 'customer' in the process. Job rotations were implemented to aid the learning process and to become familiar with the next activity. The resulting cross-skilling of members increased awareness and created a more flexible workforce. Absenteeism no longer created problems as members interlinked to fill the gap.

Results of restructuring included a significant reduction in lead times, work-in-progress value, waste, floor space requirements, product routing distance, customer complaints, supervision needs, set-up times, holdings of raw materials, and invoice lead times. Continuous small improvements became a feature of process flows. A Kanban system was introduced to aid some product deliveries. All was achieved without new capital equipment purchase.

A major obstacle was employee attitude. Former management practices had created a rift amongst all company employees, and any actions by the new management were treated with marked suspicion. It took time for this to break down. Fears disappeared as workers saw the benefits emerging from the changes. Resistance to change and the power of shop floor politics gradually turned around to become openly supportive.

A consequential problem that emerged was that Sales Division had difficulty accepting that delivery lead times were shorter. Even after delivering consistently within a 3 to 4 week period for a few months, the Sales Department remained reluctant to advise customers that delivery times were under 6 weeks. This skepticism gradually evaporated only after customer delivery was consistently early.

After six months, factory employees became concerned that once they had caught up on the backlog of orders, that work would run out. An awareness exercise was conducted to reassure factory workers that current orders were being effected, and that an order bank existed. Indeed, the company now had more forward and repeat orders than backorders. More importantly, jobs were not commenced until they were ready to be 'pulled' through from the preceding workstation. The result was that the value of work-in-progress was substantially reduced, uninvoiced orders dropped,

and output and improved finished product flows boosted sales revenue.

The transition process began first to impact on the support system. Initial internal reports indicated a backlog of orders, yet in reality the tracking process was unable to keep pace with the speed of factory output. Pressure was put upon the information system to reduce the information flow cycle time.

The company strategy focusses upon customer service, offering quality products at competitive prices with reliable delivery. There has been a dramatic turnaround in customer delivery time. Most orders are filled in two weeks, and specials can be accommodated for a surcharge in 72 hours. Almost all screenprinted products are completed within 1.5 weeks.

The term Quality took upon a new meaning within the company. Employees are called and act as Teams, a descriptor from **T**owards **E**xcellent **A**ustralian **M**anufacturing adopted by the Technology Transfer Council.

Good housekeeping practices and a preoccupation with quality are now considered integral to the job. Machine relocations and more functional placement of support systems resulted in considerable savings in work travel distances, the reduction of non-value adding activities, and a decrease in cycle times. Improvements were achieved without major capital investment. The major outlay was increasing electrical connections for relocated equipment. Absenteeism is well down, and many employees comment that they look forward to coming to work.

Management support systems are implementing their own version of VAM principles to match the factory work rate. Sales staff meet more frequently with those from production to streamline customer requirements.

Future focus will be on training employees. To improve the data collection and interpretation techniques, the management is looking at what TAFE colleges have to offer. Teams will concentrate on issues related to the specific product. In this context, specific measurable objectives have been set in collaboration with the Teams and include such goals as reducing set-up times, reducing rejects, and fine-tuning work-in-progress.

Further factory layout improvements are envisaged, especially to reduce set-up times and waste. The Marketing Division is working on a new product range, and making alterations to existing product designs in response to customer and production needs.

CALLIDE 'B' POWER STATION

Callide 'B' is a 2 X 350 MW unit thermal power station located 15 kilometres north-east of Biloela in Central Queensland. The QEC has negotiated a multi-skilling agreement with power industry unions at Callide 'B'.

In early 1987 during the first stages of the commissioning program, job redesign and industrial negotiations precluded recruitment. As well, the skills development programs which were being created as a result of job redesign and multi-skilling could not be implemented without proper training support. For these two reasons, there was an urgent need to develop in-house quality training.

The basic operation and maintenance functions in a power station are hands-on 'doing' applications and require utilization of applied skills and competencies. The jobs of utility worker, coal controller, power producer, and supply assistant all require some understanding of 'Power Station Technology'. A training program covering this topic is designed to give a general understanding of power station plant and systems with a view to providing a basic training for employees entering the operating function, or to enhance the effectiveness of employees engaged in advanced maintenance.

Remuneration for the job classifications indicated above was agreed on a work-value basis, maintaining existing award relativities and equating new classifications with existing bench-marks.

According to Callide 'B' management, if employees are going to be remunerated for skills acquisition, traditional training cannot guarantee outcomes which provide competence to a minimum acceptable level.

Hence Callide 'B' developed their own competency-based training program. All the training has direct relevance to the applied competencies, and is gained through student-centred activities. The training is individualised and self-paced. It is believed that skills formation via competency-based training can markedly improve productivity. The training is conducted using a number of delivery methods. Most basic training is delivered by computer-aided instruction supported by written training modules.

It is believed the use of computer-based training for increasing productivity enhances an employee's self-esteem, validates the training as relevant and achieving outcomes, provides for skills practice, and develops a sense of usefulness. This approach also provides for active learning, individualised schedules, learner-controlled learning in electronic contexts, and a competence orientation. Such a computer based learning program has been devised at Callide 'B'. A Local Area Network (LAN) allows multiple student access to the program.

Callide 'B' management recognised that where existing training enables additional remuneration, this then becomes the transition point for progressing from one level to another. They also noted that training at Callide 'B' would be much more readily accepted if the skills obtained were portable. Consequently they adopted, wherever possible, existing TAFE courses in those areas where general skills training is required. Credit points are assigned to such training modules based on the number of hours of TAFE

attendance required to complete the training. To facilitate this training, the Gladstone College of TAFE have made available to Callide 'B' Training Section all relevant course material to enable this training to be carried out on site. Callide 'B' training co-ordinators have been assessed by TAFE and accredited as TAFE instructors: the Station has been given TAFE Annex status. Successful completion of the training earns the relevant TAFE certificate. Where possible the training has been modified to suit the Callide 'B' competency-based training program. This training is audited by TAFE to ensure the appropriate standards are met. Consequently Gladstone TAFE College has benefited from the updating of courses. Mechanisms are being developed by the Queensland Distance Education Centre (QDEC) to incorporate material from these updated courses into the distance education programs provided throughout Queensland.

Clearly however there exists some training which is necessarily station-specific. Examples are machining techniques; some power station technology; alignment techniques for large motors and turbines; valves - packing, overhaul, and current packing technology; complex belts and drives; and plant-oriented machinery installation.

Another interesting development consistent with progress in award restructuring is a recent initiative by Callide 'B' management to train three current utility workers as mature age apprentices and so provide enhanced career paths for them. The mature age apprenticeship provides a link between the utility workers' skills and trade base skills. Training will be based on the modular structure developed for the metal and engineering industry by TAFE nationally. Such a development is in accordance with the structural efficiency principles as stated by both Federal and State industrial tribunals.

Overall, training at Callide 'B' is difficult to separate as an independent function because it is well integrated into the every-day routine of the workforce. Because of this there is a strong sense of ownership of the training by the workforce.

OVERALL IMPLICATIONS FOR TAFE

The case studies in the textiles and metals industries highlight the fact that award restructuring involves a three-fold linkage between job classifications, wages, and skill formation paths. Job classification structures consist of a broad-banding of existing job categories into a series of generic job titles carrying greater levels of skill and responsibility. Competencies linked to each job category are spelt out in a schedule attached to the award. The wages structure then complements job classifications by offering graduated increments in pay as a worker moves up the scale of classifications, acquiring more skills by undergoing further training. The skill training requirements under award restructuring incorporate a concern for a career path and the personal education and training needs of the individual. As Streeck points out,

> Industrial training is not just the acquisition of manual or mental skills but it is also, and increasingly needs to be, a process of socialisation in work-related values, in a culture and community of work in which extra-functional skills like reliability, the ability to hold up under pressure, and solidarity with others working at the same tasks are highly regarded and rewarded. (Streeck 1989, p.98)

In this way education and training are integrated within the workplace. For the first time in Australian industrial relations, the definition of skills, competency and assessment procedures as well as accreditation of training programs have been brought explicitly within the scope of the industrial relations system. There is a responsibility within award restructuring for the education and training system to be responsive, and provide an articulated structure of qualifications. The TAFE input is directed towards intervention strategies that meet industry and enterprise needs for apprenticeship training or an equivalent, provide different points for entry and exit, competency-based testing, accreditation, national standards, and portability of qualifications between States. TAFE has specific responsibility for retraining at both general and applied skills levels, and accommodating training initiatives on the job using particular enterprise equipment. Modular courses need to be developed in collaboration with the enterprise and specific industry.

In the manufacturing sector maintenance skills are critical. In general, the more that production processes are automated, the more important it becomes to prevent machines breaking down; or, if they do break down, the more vital it is to repair them and get them back into production as quickly as possible. Most of the time taken in this exercise is spent on finding the fault (partly because there are now combinations of electronic and mechanical systems and many potential fault sites in complex systems) in the machine tools, the software, the raw materials being used, and so on. The contribution which skilled maintenance personnel make to this is obvious.

Enterprises also need to consider training as a long-term objective. In the current 'market philosophy' the notion of the delivery of long-term and costly training packages from industrial agents committed to short-term profit is an inherent contradiction. In the restructuring context, short-term profits will be harder to achieve if enterprise-based training is not considered as fundamental rather than peripheral to the future of the enterprise. Such an approach towards skills formation provides for career paths and greater expansion of internal labour markets within the companies (Littler 1988).

Present approaches are based on stable, well-defined and specialised occupational classifications. Clearly, adjustments are required. A responsive TAFE system needs the ability to adapt its curricula rapidly and flexibly enough to keep pace with the demands posed by accelerating organisational and technological

change. TAFE policy-makers have to be careful that their existing approaches to rules, central control, orderly systems, standards, and power politics are not so entrenched and immutable that the enterprise-based training proceeds at a faster pace than TAFE educators can cope with. What is required is a responsive, flexible TAFE system that accommodates the industry-enterprise initiatives, such as is the experience at Callide 'B'.

There are pertinent resource implications for TAFE. Relationships between education, training and economic performance are complex. Reliance on over-simplistic solutions or on a mix of inconsistent policies will not overcome the problems and may make them worse. In this section some observations are made regarding what the case studies reveal about resource implications for TAFE. Educational planners and policy-makers must be informed by the major qualitative changes that are taking place in the workplace, which are illustrated by examples from these case studies. There are significant resource implications as TAFE takes the opportunity to significantly revitalize education and training programs, especially in its approach to flexible work environments.

TAFE is subject to utilitarian priorities in the development of the workforce with its other competencies and commitments. In current economic circumstances TAFE systems need to balance the provision of commercially useful knowledge, where education is seen as a commodity, while at the same time not neglecting the political, cultural, social, personal and other aspects of education and training. Students need to be equipped with the fundamental, expansive skills of being able to critically reflect upon the changes taking place in their work and in the wider society. One implication of award restructuring is the development of both technical and life-long skills. The emphasis on operational flexibility in manufacture through FMS cells, for example, is creating a demand for affective skills, such as critical self-analysis and a reflective orientation.

Balancing these demands within TAFE, and allocating resources equitably is a sensitive resources management issue. The use of TAFE educational institutions to serve the productive sector by giving priority to the production of commercially useful knowledge while neglecting the life-long learning aspects of TAFE should be avoided.

Evidence from the case studies indicates that pressure now exists within these enterprises for education and training to become an integral part of effective performance. There is an emerging recognition of the need for skill training requirements as well as a concern for the personal education and training needs of the individual. Each enterprise workforce surveyed is contributing to a new perspective on learning and innovation, and this is creating demands for education and training that are central to micro-restructuring at the enterprise level. As Australian industry copes with the emergence of a macro/micro framework wherein national restructuring imperatives operate alongside restructuring within enterprises, greater demand will be placed

upon TAFE systems to match the requisite education and training needs. For instance, on-site provision of training by TAFE, such as in the Callide 'B' case, will become more widespread. This requires long-term planning by TAFE policy-makers so that resources are allocated within an appropriate timing sequence.

Another area highlighted within the case studies is the cost of educated labour relative to that of other productive inputs such as other types of labour and capital. This, in combination with the effect of changes in technology and organization of the workplace on the relative productivity of different types of labour, becomes an issue for TAFE distribution of resources. First there is the under-education aspect, where workers with at-risk backgrounds do not have the educational experience and skills to qualify them for entry-level jobs, or to benefit from training that will provide upward mobility. One implication of award restructuring and its multi-skilling emphasis is that, under existing industry conditions a proportion of workers are initially under-skilled. Similarly, the issue of over-education arises where workers are trained to significant levels of skills acquisition but no longer require that level of skills for given jobs.

As industry restructuring within a macro/micro framework exercises greater influence, TAFE systems need to find a balance for allocating resources between supporting the underskilled to attain a particular level of competence for designated jobs, while ensuring that scarce resources are not wasted by offering training in excess of labour market and specific job needs. Here care is also needed in interpreting the impact of technology. There will be relatively few new high-technology jobs in industry. The real effect of technology is upon how work is conducted and processed, and it is in this area that TAFE should direct its resources. By so doing TAFE addresses educated industrial workforces that have adapted new manufacturing technologies thereby providing the potential flexibility to address the customized needs of different markets.

It is in the interest of enterprises to increase productivity through flexible workplaces, customized production, and worker participation in the planning of control and production.

Data from the case studies indicate that workplaces are being reorganized and becoming less hierarchical. There is less supervision and a greater scope for autonomy, initiative, and discretion by workers. They have solved problems both individually and in groups, and communicate in team meetings and other situations. Interpreting available information, and providing leadership and coordination are other competencies exhibited. This is one area where the case studies reveal a renewed responsibility for TAFE planners. It is the delicate balance referred to earlier where the operational flexibility of the workplace reveals the need for both technical skills and a new set of competencies that include initiative, cooperation, group work, peer training, evaluation, communication, reasoning, problem-solving, decision-making, obtaining and using infor-

mation, planning, learning skills, and multicultural skills (Levin and Rumberger 1989).

Another resources implication for TAFE to match the need for these competencies is the development of more imaginative approaches to curricula and instruction. A redirected curriculum focus is needed, with the curriculum being the mechanism by which all the elements of the vocational education and training system are brought together and integrated.

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Littler, C.R. (1988). Technology, innovation and labour-management strategies. In Urabe, K., Child, J. & Kagono, T. (eds.) **Innovation and Management: International Comparisons**, p.337-358. Berlin: Walter de Gruyter.

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Zeitlin, J. (1989). Local industrial strategies: introduction. **Economy and Society**, 18 (4), 369-373.

Zuboff, S. (1988). **In The Age Of The Smart Machine**. Heinemann: Oxford.

FURTHER READING

Adler, P. (1986). New technologies, new skills. **California Management Review**, 1, (Fall), 9-28

> **Adler** suggests that the new features of transformed work that are critical are responsibility, abstractness, and interdependence. These three features lead to three clusters of new or enhanced job requirements intimately associated with the more advanced technology: responsibility-for-results, abstract master, and systemic interdependence.

Adler, P.S. & Borys, B. (1989). Automation and skill: three generations of research on the NC case. **Politics & Society**, 17 (3), 377-402.

> The co-authors contend that the technological characteristics of the available machinery and the competitive pressure to capitalise on those characteristics are increasingly likely to dominate institutional and social factors as focus shifts from the local and/or short-term to the aggregate and/or long-run trends of the use patterns of automation.
>
> They list five important policy implications:
>
> (1) As **substantive complexity** increases, both generic and firm-specific skill requirements tend to increase, with firm-specific skill requirements becoming more important.
>
> (2) As the scope of worker **responsibility** increases in automated systems, firms must find ways of eliciting and sustaining a much higher degree of commitment on the part of workers. More participative decision-making processes may be required to sustain enthusiasm for these new responsibilities.
>
> (3) The increasing **abstractness** of automated work requires an increased level of general and scientific knowledge that places demands on new training methods and more extensive content in programs. The weaknesses of the public education system become increasingly costly.
>
> (4) The interdependencies brought about by automation increases dependence on others for one's own success.
>
> (5) The **professionalisation** of operators will mean they increasingly need to play a proactive role in continually updating their skills. This professionalisation will exacerbate pressures to turn the authoritative relationship between managers and operators into a more collaborative one.

American Apparel Manufacturers' Association. (1988). **Making the revolution work. Report of the Technical Advisory Committee: How to implement flexible apparel manufacturing through people.** Washington.

The Report argues that apparel manufacturing must become more responsive to meet the changing demands of its retail markets and its labour markets. It describes flexible apparel manufacturing as a positive response to accommodating the changes affecting the apparel manufacturing industry. Within that context, and based on the supporting case studies, the Report recognises that flexible manufacturing is designed to maximise the contributions of people in the workplace.

Badham, R. & Mathews, J. (1989). The New Production Systems Debate. **Labour & Industry**, 2, (2), 194-246.

The authors propose a model of production systems that acknowledges the co-existence of paradigms in manufacturing. They characterise prevailing production systems as embodying mixes of Fordist, neo- and post-Fordist production paradigms; and argue that the resolution between these competing paradigms will occur through the mediation of politics, industrial negotiation, and the operation of markets.

Clarke, K., Ford, D. & Saren, M. (1989). Company technology strategy. **R & D Management**, 19 (3), 215-229.

The authors conclude that the major contribution which studies in the area of technology can make is to assist managers in their process of understanding the technological network of which their firms form part; in making sense of their own product and process technologies and in disentangling them from their narrow applications; in using technology as a surrogate for the companies' resources and capabilities in developing the acquisition and maintenance of those resources and their optimal exploitation.

Granovetter, M. (1985). Economic action and social structure: the problem of embeddedness. **American Journal of Sociology**, 91 (3), 481-510.

Granovetter addresses the extent to which economic action is embedded in structures of social relations, in modern industrial society. For him, most behaviour is closely embedded in networks of interpersonal relations. He establishes that in institutional economics, transactions are carried out both in the market, and subsumed within hierarchically organised enterprises.

Hayton, G. & Harun, M. (1988). **Training for Integrated Manufacturing: A reivew of recent literature**. Adelaide: TAFE National Centre for Research and Development.

An explanation of integrated manufacture is provided and then the literature covering the trend from mass production to integrated (or flexible) manufacturing is discussed. Technical and human aspects of integrated manufacturing are considered. The effects on the manufacturing skill requirements are discussed with reference to the literature. The paper concludes with an examination of the implications of integrated manufacturing for TAFE and industry training.

Kantrow, A.M. (1980). The strategy-technology connection. **Harvard Business Review**, July-August, 6-21.

Kantrow points out that technology and strategy are inseparable, for technology has an inner logic that simply must be considered in a company's strategic planning. He identifies the need to place technological decisions in the context of overall corporate strategy.

Kutscher, R.E. (1987). Labor force changes in the United States: implications for education and training. In Wacker, G.B. (ed.) **The Future of Working Wisconsin**. Madison, University of Wisconsin. p.3-18.

Kutscher identifies trends important to accessing educational and training requirements as occupational mobility among the young; continued restructuring of the economy both by industry and occupation; and a gradual shifting of this restructuring toward higher-skilled jobs and away from lower-skilled jobs. He contends that future jobs will require workers who are able and willing to learn throughout their working lives. Thus those who succeed in the workplace will know how to learn, be well grounded in fundamental knowledge, and have mastered concepts and skills that create an intellectual framework to which new knowledge can be added as the almost inevitable workplace changes unfold.

Levin, H.M. (1987). Improving productivity through education and technology. In Burke, G. & Rumberger, R.W. (eds.) **The Future Impact of Technology on Work and Education**. London, Falmer. p. 194-214.

Levin argues that education and technology represent two of the most important routes to raising productivity. New technologies - and especially those associated with micro-electronics - have the capability of further routinising and simplifying work tasks into repetitive and machine-monitored functions, or of expanding the decision role of workers to take advantage of their skills and education. He suggests that the major potential for improving

workplace productivity is found in expanding the allocative role of workers to improve resource allocation in their work domains. This will require the establishment of work organisations with more emphasis on worker participation and the use of autonomous and semi-autonomous work groups and teams. He also argues that the organisation of the modern workplace is based upon social and economic choices rather than being technologically determined. In this sense, a workplace with greater human challenges, worker discretion, and allocative efficiency is also one that is consistent with technological advance.

Lloyd, C. (1989). Restructuring in the West Midlands' clothing industry. **New Technology, Work and Employment**, 3, 100-107.

Lloyd reviews the flexible specialisation debate in the context of the clothing industry in the West Midlands. She questions the central importance given to the introduction of technology in the recent restructuring of the industry, and argues that such changes do not necessarily benefit the workforce.

Majchrzak, A. (1986). The effect of CAM technologies training activities. **Journal of Manufacturing Systems**, 5 (3), 203-211.

Majchrzak suggests that the accelerating rate of technological change makes the continuity of training an increasingly important characteristic of machine-tool operator jobs. Her evidence on type of CAD/CAM training adopted reveals that among the 45% of plants adopting CAD/CAM training, training was more broad-based than training programs for conventional equipment. Over one-half of the programs provided training not only in traditional skills (i.e., safety, specific machine operation, and maintenance), but in more generic skills as well. Generic areas taught included problem-solving, general knowledge of technological advances in the plant, and knowledge of manufacturing processes to understand how the new technology fits in.

She notes that it is interesting what skills were **not** taught at plants. These included 'human relations' skills, 3 R's, and basic science and engineering. This finding was surprising since quality control demands basic maths knowledge; rudimentary maintenance of CAD/CAM relies on rudimentary knowledge of engineering (e.g., hydraulics); and such human relations skills as group process, communication, and leadership were expected to be essential with CAD/CAM.

Mathews, J.A. (1989). New production concepts. **Prometheus**, 7 (1), 129-148.

The new concepts, such as 'flexible specialisation', 'human-centred production', and 'diversified quality production', are all in one way or another seeking to

characterise a form of 'functional flexibility' that both enhances productivity and offers workers themselves a greater sense of involvement with their activity. The new concepts rest on the identification of a critical linkage between work organisation, skill formation and advanced manufacturing technology. They point to a convergence between the previously separate worlds of work and of learning.

Mathews points out that these new production concepts are intrinsic to new socio-institutional innovations that are needed to ensure the 'assimilation' of the new technologies within the economic and social systems.

Spenner, K.I. (1988). Technological change, skill requirements, and education. In Cyert, R.M. & Mowery, D.C. (eds.) **The Impact of Technological Change on Employment and Economic Growth**, p.131-184. Cambridge, Mass.:Ballinger Publishing Company.

According to **Spenner** there is an uncertain, complicated, and contradictory relationship between technological change and the skill requirements of work. Technology has substantial effects on the composition and content of work in the economy, but these effects vary for different dimensions of skill, for different jobs, occupations, industries, and firms, and for different technologies. The effects involve complicated mixtures of offsetting compositional and content changes, of skill upgrading and downgrading. For **Spenner**, it is most important to note that the effects of technological change on the skill requirements of work are set in a larger context of market forces, managerial prerogatives in implementing technologies, and organisational cultures, all of which condition the effects of technological change.

He argues that policies for education and training must attend to these uncertainties. Currently they are limited by the lag between schooling and greater productivity, the loose linkage between skills of workers and skill demands of jobs, and the uneven and uncertain responses of managers and firms to uncertainty. To be avoided are education and training policies that assume a single, simple or unitary effect of technological change on the number or quality of jobs.

Wyatt, G. (1989). New technology and the economic organization of the clothing industry. **Technology Analysis & Strategic Management**, 1 (3), 299-312.

Wyatt identifies that firms which innovate by adopting the new technologies will have a much greater integration of the design, production and marketing function than before. The logic of the new technologies is to bind the stages of production, from the initial conception of the product to its final destination with the customer. In adopting the new technology the firm will also need to make substantial

organisational and managerial innovations. The incentive to innovate should be greatest for the firms which still carry out the bulk of their productive activities in the high-wage countries.

Zeitlin, J. & Totterdill, P. (1989). Markets, technology and local intervention: the case of clothing. In Hirst, P. & Zeitlin, J. (eds.) **Reversing Industrial Decline? Industrial structure and policy in Britain and her competitors**. Oxford, Berg: p.155-190.

These authors argue that recent developments in the market for clothing and retailer strategies have expanded the demand for better-quality, more fashionable garments, while related changes in technology and manufacturing methods have reduced the cost penalty associated with the production of a variety of styles in shorter runs. These shifts, which reflect a broader movement from mass production towards the flexible specialisation also visible in other sectors, have tilted the balance of competitive advantage for many types of garment away from low-wage suppliers in developing countries, and have opened up new and remunerative opportunities for clothing production in the advanced economies. In the UK some local authorities have seen clothing as a major site for new forms of local industrial intervention.

Zuboff, S. (1988). **In The Age Of The Smart Machine**. Heinemann: Oxford.

Zuboff draws attention to the world of computer mediated work, which she describes as a person accomplishing a task through the medium of the information system, rather than through direct physical contact with the object of the task. Within her approach, information technology is not mute. It imposes information, and also produces information. It accomplishes tasks and translates them into information. By so doing, information technology introduces the dimension of reflexivity: it makes its contribution to the product, but it also reflects back on its activities and on the system of activities to which it is related. This unique capacity is termed 'informate' - activities, events, and objects are translated into and made visible by information when a technology informates as well as automates. The educational implications of the automate and informate dimensions of information technology within informated organisations are critical to curriculum change, organisational responses for educational administration, the funding of hardware supply, and shifting the perspectives of the educator.

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